

PAT-NO: JP404035033A  
DOCUMENT-IDENTIFIER: JP 04035033 A  
TITLE: MANUFACTURE OF FERROELECTRIC THIN FILM  
PUBN-DATE: February 5, 1992

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APPL-NO: JP02143113

APPL-DATE: May 31, 1990

INT-CL (IPC): H01L021/314, H01L027/04

US-CL-CURRENT: 118/715, 427/99

ABSTRACT:

PURPOSE: To form a thin film of good crystalline ferroelectric free of pin holes with a well-controlled composition on a device on a silicon substrate (by producing microwave plasma through electron resonance to create active oxygen species for depositing ferroelectric material.)

CONSTITUTION: Vapor from a vapor source 1 composed of Pb-La-Zr-Ti alloy is supplied to form a thin film of  $\text{Pb}_{0.92}\text{La}_{0.03}\text{Zr}_{0.65}\text{Ti}_{0.35}\text{O}$  on a platinum substrate 2. While oxygen gas is supplied through a pipe 6, microwaves are introduced from a 2.45GHz source 4 into a 875 gauss field

produced by a magnetic field generator 5. As a result, plasma is produced by a cyclotron resonance of electrons to create active oxygen species. The species are emitted to the platinum substrate 2, heated to about 500°C, and thus the thin film is provided. The active oxygen species may be replaced by ozone at 10 cm<sup>2</sup>/min, atomic oxygen at 5 cm<sup>2</sup>/min, or N<sub>2</sub>O at 10 cm<sup>2</sup>/min.

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